LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

VOLKSWIRTSCHAFTLICHE FAKULTÄT

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Is the veil of ignorance only a concept about risk? An experiment

Munich Discussion Paper No. 2007-4

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Is the veil of ignorance only a concept about risk? An experiment

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January 8, 2007

Abstract

We implement the Rawlsian thought experiment of a veil of ignorance in the laboratory which introduces risk and possibly social preferences. We find that both men and women react to the risk introduced by the veil of ignorance. Only the women additionally exhibit social preferences that reflect an increased concern for equality. Our results for women imply that maximin preferences can also be derived from a combination of some, not necessarily infinite risk aversion and social preferences. This result contrasts the Utilitarians' claim that maximin preferences necessarily represent preferences with infinite risk aversion.

Keywords: veil of ignorance, social preferences, equality, efficiency, experiment

JEL classification: D63, D64, C99

1 Introduction

We present an experiment that explores the relationship between social preferences and the maximin principle. According to Rawls (1971), behind the veil of ignorance

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†I thank seminar participants at the Universities of Munich, Stockholm, Göteborg, the SMYE conference in Sevilla, the SFB conference in Frauenwörth for helpful comments on earlier versions of this paper, Klaus Schmidt for his valuable support during the preparation of this paper and Kathrin Kolb and Björn Schildberg for their support during the implementation of the experiment.

society would agree that the maximin principle should constitute the basis of the social contract. Behind the veil of ignorance, nobody knows which future position he (as well as other individuals) will be assigned to when deciding how to distribute resources across different positions. The maximin principle states that society should maximize the utility of the individual that is worst off. Utilitarians have claimed that voting for the maximin principle is only optimal for infinitely risk averse individuals. However, this argument assumes that everybody is only interested in his own material payoff. If people have social preferences they could be in favor of an egalitarian distribution even if they are risk neutral.

Theories on social preferences assume that people are self-interested to some degree, but also care about the (payoffs of) others.[1] In our experiment, subjects are exposed to a decision situation behind the veil of ignorance. Implementing the veil of ignorance we are able to measure social preferences that are free of self-interest ("impartial social preferences"). In other words, impartial social preferences are an individual's preferences over distributions of payoffs to himself and his reference group when being selfish is not possible. Information on people's impartial social preferences can be useful for many aspects of policy design, e.g. the design of a tax, a social security or a public health insurance system. Imagine, as an example for eliciting social preferences, a survey in which you ask a poor person whether he is in favor of more redistribution. If you get the answer "yes" you cannot interpret it unambiguously: does it mean that this person prefers more redistribution because he is likely to profit from it? Or does this person have an innate preference for a more equal society? In contrast, if you had asked this person in the situation behind the veil of ignorance and had received the (now impartial) answer "yes" you would have known that the latter is true (or that this person is risk averse).

Besides potentially introducing impartial social preferences, the veil of ignorance introduces risk. We use a second, nearly identical control treatment to isolate a subject's risk preferences. If we find no difference between the behavior in the treatment implementing the veil of ignorance and the control treatment the claim that the maximin principle can only be derived from infinite risk aversion is correct. Assume in contrast that we observe a significant difference between the two treatments and the impartial social preferences measured in the treatment implementing the veil of ignorance reflect an increased concern for equality. Then the maximin prin-

[1] Focusing on the distribution of payoffs the notion of social preferences we use is most closely related to Fehr and Schmidt (1999) and Bolton and Ockenfels (2000). For a recent survey on the literature on social preferences see Fehr and Schmidt (2006).

ciple could also be derived from a combination of some, not necessarily infinite risk aversion and impartial social preferences.

Our experimental design is based on a dictator game. A dictator game is a two player game in which the first player, the dictator, proposes a split of a given pie. The second player, the receiver, has a purely passive role. Both players are paid according to the dictator's proposal.[2] The dictator game used in this experiment has two additional features. First, it is characterized by an efficiency loss of 50% for units that are transferred from the dictator to the receiver. Consequently, a trade off between equality and efficiency[3] arises: a more equal allocation can only be achieved by transferring more which in turn induces a larger efficiency loss. Second, we implement the veil of ignorance by introducing role uncertainty: each participant decides how many units of a 12 unit pie the dictator will give away to the receiver *before* he is randomly assigned the role of dictator or receiver with equal probability. Finally, each participant's decision will be implemented as the dictator's choice irrespective of whether the decision maker has been assigned the dictator or the receiver role. Implementing the veil of ignorance removes the possibility to act self-interestedly and at the same time, introduces risk.

We use a three treatment design: the benchmark case is the dictator game treatment that corresponds to a classical dictator game with an efficiency loss and no role uncertainty. The impartiality treatment is characterized by the same efficiency loss, but adds role uncertainty. The risk treatment is the same as the impartiality treatment except for one difference: it is a one person game in which each participant decides how to allocate the pie across the states of being dictator or being receiver and is randomly assigned the position of either dictator or receiver afterwards. However, the position not assigned to the decision maker is not filled in by a second person.

Comparing the behavior in the dictator game and the impartiality treatment sheds light on the differences between social preferences without and behind the veil of ignorance. The risk and the impartiality treatment differ only with respect to whether the second person exists or not, i.e. whether impartial social preferences could be present besides the risk motive. Comparing the results of these two treatments we can find out whether impartial social preferences play a role behind the veil of ignorance and whether they induce an increased concern for equality or for

[2]The classical dictator game was first introduced by Forsythe et al. (1994).

[3]In this paper, a more efficient allocation is defined as an allocation with a higher sum of payoffs of both players.

efficiency.

We find that social preferences without and behind the veil of ignorance clearly differ for all subjects. Behind the veil of ignorance only a minority of subjects opts for the maximin principle. The vast majority of male participants perceive the veil of ignorance as introducing only risk. In contrast, for women, impartial social preferences are a second significant motivation that induces a stronger concern for equality. Our results for women imply that maximin preferences can also be derived from a combination of some, not necessarily infinite risk aversion and impartial social preferences. The results are well in line with the current literature on gender differences in social preferences and risk attitudes. We complement this literature by offering new insights in gender differences with respect to impartial social preferences.

Only few other experiments in economics have elicited impartial social preferences. In Engelmann and Strobel (2004), the decision maker's task is to choose among three different allocations of payoffs across three persons that represent an efficiency-equality trade off. Since the decision maker's payoff is constant across all three allocations the experimental design controls for self-interest. In contrast to the idea of the veil of ignorance that is reflected in our experiment, a constant payoff for the decision maker implies that he is not affected by his own choice. This might have an important influence on the observed decision behavior: First, the decision maker has no monetary incentives to reveal his true preferences.[4] Furthermore, imagine a decision maker who prefers a very efficient, but highly unequal allocation. If he chooses the unequal allocation he "punishes" some of the other subjects while being on the safe side himself. In contrast, in our experiment, the decision maker himself risks getting a very low payoff when choosing an unequal allocation. The latter setting seems more appropriate to measure impartial social preferences behind the veil of ignorance.

Some other economic experiments explicitly refer to the Rawlsian veil of ignorance. Johannesson and Gerdtham (1995), Beckman et al. (2002), Johansson-Stenman et al. (2002), Carlsson et al. (2003) as well as Carlsson et al. (2005) basically let subjects who do not yet know the place they will occupy in a given society choose between societies that differ with respect to mean income and distribution of income. Ackert et al. (2004) ask subjects to vote in favor of either a lump-sum or a progressive tax regime before they are randomly assigned a pre-tax payoff. To be able to interpret the observed behavior in terms of impartial social

[4] Additionally, sensitivity to framing effects might rise as participants do not have to act on the endorsed fairness ideals (compare Cappelen et al., 2005, p.2).

preferences, all mentioned experiments have to assume that subjects are risk neutral. Otherwise, the observed behavior can only be interpreted as the result of either risk aversion *or* impartial social preferences. The new contribution of our experiment is that we are able to separate the effects of risk aversion and impartial social preferences in a veil of ignorance setting.[5]

The remainder of the paper is organized as follows. The details of the experimental design are explained in section 2. Section 3 presents the hypotheses to be tested and links them to the experimental design. Results are provided in section 4 that also elaborates on the striking differences in the behavior of male and female participants. In the last section, we conclude.

2 Experimental Design

The experimental design is based on a dictator game. Since the receiver has a purely passive role the dictator game is one of the simplest ways to elicit the dictator's social preferences that do not interfere with any strategic considerations. Furthermore, the dictator game is easy to understand experimental subjects. In our experiment, dictators have to decide how to split a 12 unit pie.

Our version of the dictator game has two additional features. First, it is characterized by an efficiency loss of 50% for units transferred from the dictator to the receiver. This efficiency loss introduces a trade-off between equality and efficiency and can be interpreted as a deadweight loss that arises as the cost of redistribution. While an efficiency loss of 50% might seem very large at first sight, it is easy to calculate for the experimental subjects and makes the results of our experiment comparable to those obtained in Andreoni and Miller (2002). As the dictator can only transfer integer units, the following allocations are possible results of the game:

Table 1: Possible allocations (in units)

dictator	12	11	10	9	8	7	6	5	4	3	2	1	0
receiver	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6

[5] The veil of ignorance has also been the subject of experimental inquiries in other disciplines such that political sciences and psychology (Brickman, 1977; Curtis, 1979; Frohlich et al., 1987; Bond and Park, 1991; Mitchell, 1993).

There are two focal points among these allocations: the allocation (12,0) represents the most efficient one (and at the same time, the one an egoistic dictator would choose). An individual with maximin preferences or, more generally, a very strong concern for equality would choose the allocation (4,4). Transferring more than necessary to achieve the equal split allocation (4,4) is hard to rationalize: the resulting allocations impose an enormous efficiency loss and add inequality.

A second specific feature of the dictator game is that we implement the veil of ignorance by introducing role uncertainty: First, every participant has to decide how many units the dictator will transfer. Only after that roles (dictator and receiver) are randomly assigned and pairs consisting of one dictator and one receiver are matched. Finally, *every* participant's decision will be implemented as the dictator's choice independent of whether the decision maker has been randomly assigned the role of dictator or receiver.[6] A subject that has been assigned the receiver (dictator) role will be paid the receiver's (dictator's) payoff according to his *own* decision how many units the dictator will transfer to the receiver. Implementing the veil of ignorance as described above induces both risk and impartial social preferences. To be able to isolate impartial social preferences from risk considerations and to test the hypothesis that the veil of ignorance is only a concept about risk we have to separate the effects of risk and impartial social preferences on subjects' decision behavior.

This is achieved by a three treatment design. All three treatments are based on the dictator game and share the feature of a 50% efficiency loss for units transferred. The *impartiality treatment* is a dictator game with a 50% efficiency loss and role uncertainty. The decision observed in the impartiality treatment reflects a subject's impartial social preferences in a risky environment. The *risk treatment* differs from the impartiality treatment in just one respect. It is a one person game and consequently, basically a lottery decision: first, each subject decides how to allocate the pie across the states of being the dictator or being the receiver. After that decision each subject is randomly assigned the role of either dictator or receiver with equal probability. In contrast to the impartiality treatment, there is no second person who fills in the role that has not been assigned to the decision maker. The data obtained in the risk treatment simply reflect the individual degree of risk aversion.[7]

[6]This is possible as each subject also serves as a dummy player in another subject's decision. Subjects are told so only at the end of the experiment.

[7]The experimental design cannot distinguish between subjects who are risk neutral and those who are risk loving. Both will choose the (12,0) allocation. This might be a flaw as, ceteris paribus,

The third treatment, the *dictator game treatment*, serves as a benchmark case and measures (partial) social preferences: it corresponds to a classical dictator game with an efficiency loss and no role uncertainty. Table 2 summarizes the three treatments.

Table 2: the three treatment design

treatment	characteristics			what is measured?
	efficiency loss	role uncertainty	number of players	
dictator game	yes	no	2	social preferences
impartiality	yes	yes	2	impartial social preferences with risk
risk	yes	yes	1	risk aversion

The experiment was conducted single-blindly. Each subject participated in two out of the three treatments: in the risk treatment and randomly in one of the two two-player treatments, either the dictator game or the impartiality treatment. After all subjects had made their first decision, we announced that there would be a second and absolutely last experiment ("false restart"). To avoid income effects we did not give subjects any feedback on the result of the first treatment before they were paid at the end of the whole session.[8]

At each time of the experiment half of the subjects played the risk treatment. These subjects were matched with the other half of subjects who played one of the two two-player treatments in the same room at the same time. This matching across treatments has two advantages: first, not only in the risk, but also in the impartiality and the dictator game treatment *every* subject's decision is in fact implemented (and every subject knows this). By this, we avoid introducing an additional source of risk in the impartiality treatment, namely whether one's own decision or the one of one's matched partner will be implemented. Consequently, we manage to restrict

a more risk loving individual will let the dictator transfer less in the impartiality treatment, a decision that we will interpret to be caused by a concern for efficiency. To avoid this problem we could have run a second version of the risk treatment with an efficiency gain instead of loss to explicitly measure the individual degree risk loving. We did not do that as we do not expect risk loving to be a major concern.

[8]Subjects could nevertheless calculate the expected amount of money they had earned in the first treatment.

the difference between the risk and the impartiality treatment to the (non-)existence of the second person. Second, we maximize the number of observations as we avoid paying passive players. As a result of the matching, each subject had three sources of payoff at the end of the session: the payoff from his own risk decision, a payoff from his own decision in one of the two two-player treatments and a payoff from his randomly assigned partner's decision in one of the two two-player treatments.

A description of the order of events during each session, a translated version of the instructions and the corresponding control questions can be found in Appendix 6.1. The experiment was programmed using the experimental software zTree (Fischbacher, 1999) and conducted at the experimental laboratory of the SFB 504 at the University of Mannheim, Germany in November 2005. The experiments lasted about one hour and subjects earned about 16 Euros on average. In sum, we collected 131 observations on decisions in the impartiality treatment, 167 in the risk and 36 in the dictator game treatment. All 167 participants[9] were university students with a large variety of subjects. The main characteristics of the participants are displayed in Table 3 below.

Table 3: Composition of treatments

	dictator game treatment	risk treatment	impartiality treatment
number of observations	36	167	131
sex	19 (F)/17(M)	59(F)/108(M)	40(F)/91(M)
mean age	23.56	23.77	23.82
knowledge in economics*	66.67%	64.67%	64.12%

*: includes students studying economics or business administration as minor or major

3 Evaluation strategy and hypotheses

Using the three treatment design depicted in Table 2 we can answer the following questions: Does the veil of ignorance make a difference? By contrasting the number of units transferred in the dictator game and the impartiality treatment, we compare

[9] We admitted only an even number of subjects to the experiment but one subject left during the course of the experiment. His role was filled by one of the experimenters and the corresponding observations were deleted.

social preferences and impartial social preferences with risk for a given trade off between equality and efficiency. Put differently, we compare distributional preferences without and behind the veil of ignorance.

Hypothesis 1

There is no significant difference between social preferences and impartial social preferences with risk that are measured in the dictator game and the impartiality treatment respectively.

If we can reject hypothesis 1 the next step will be to ask whether the observed difference can be completely explained by risk aversion: Is the veil of ignorance only a concept introducing risk? Or in contrast, are impartial social preferences an additional motivation behind the veil of ignorance?

Hypothesis 2

There is no significant difference between risk preferences and impartial social preferences with risk that are measured in the risk and the impartiality treatment respectively.

The only difference between the risk and the impartiality treatment is the existence or non-existence of a second person who is affected by the decision maker's choice. Consequently, the treatments differ only in whether impartial social preferences can possibly exist as a second motive besides the same risk motive. If we cannot reject hypothesis 2 we will conclude that the thought experiment of a veil of ignorance has correctly been perceived by economists as a concept inducing only risk aversion. The only way to derive Rawls' difference principle is to assume infinite risk aversion and maximin preferences represent an appropriate formalization of the difference principle. In contrast, if hypothesis 2 can be rejected impartial social preferences will be a further significant motivation behind the veil of ignorance. Consequently, the difference principle can also be considered the result of some, less than infinite risk aversion and impartial social preferences - in case impartial social preferences induce an increased concern for equality.[10]

[10] While the term "veil of ignorance" was coined by Rawls, Harsanyi (1953, 1955) already used the same thought experiment. Harsanyi interprets value judgments made behind the veil of ignorance to reflect choices involving just risk (and not social preferences) and assumes that agents are risk neutral. Consequently, he predicts efficiency seeking behavior to prevail behind the veil of ignorance. In terms of our experiment, Harsanyi's argument would be supported if we found that subjects do not transfer any units in the risk treatment (risk-neutrality) and if differences in subjects' behavior across the risk and the impartiality treatment were not significant.

This is investigated by hypothesis 3: given that impartial social preferences introduce an additional motive, do they induce an increased concern for equality or for efficiency? To which extent does a veil of ignorance like situation induce maximin preferences as predicted by Rawls? The combination of role uncertainty and efficiency loss reflected by the data of the impartiality treatment enables us to answer these questions.

Hypothesis 3
Behind the veil of ignorance, subjects behave according to maximin preferences.

4 Results

4.1 Gender differences

There is a growing literature on gender differences in risk attitudes as well as generosity in giving. Andreoni and Vesterlund (2001, p.305) conclude that "there are systematic differences by sex, and these can have important and interesting consequences for economic behavior" and plead for more attention to sex differences in experimental economics. We will take their claim seriously and check whether we find gender differences in our data.

In total, we had 108 male (65%) and 59 female (35%) participants. Table 4 displays the mean number of units not transferred by sex and treatment as well as test results for whether medians and distributions of the number of units not transferred differ for men and women within each treatment.[11]

In sum, we can observe striking differences in the behavior of men and women: using the Mann-Whitney test, we find that the distributions of units not transferred differ significantly across men and women both in the risk and in the impartiality treatment. The same is true for medians. In the impartiality treatment, the absolute difference in the mean is largest and amounts to about 2.2 units for men and women.

In general, results are extremely well in line with the existing literature: in the impartiality treatment, we find that women are more concerned about equality,

[11] The complete experimental data are displayed by treatment and sex in Appendix 6.2. To obtain means and test statistics we have pooled the data of all risk and impartiality treatments respectively. Test results presented in Appendix 6.3 reveal that this is legitimate: both in the risk and in the impartiality treatment the distributions of units not transferred do not differ significantly across different treatment orders. There are no order effects for both men and women separately as well as for the data pooled across sexes.

Table 4: gender differences by treatments

treatment	mean men	mean women	Mann-Whitney test*	Median test*
dictator game	11.24 (17 obs.)	9.63 (19 obs.)	p=0.061	p=0.091**
risk	9.28 (108 obs.)	8.31 (59 obs.)	p=0.014	p=0.016
impartiality	9.19 (91 obs.)	7.00 (40 obs.)	p=0.000	p=0.000

*: The reported p-values refer to two-tailed tests and are adjusted for ties.
**: In the dictator game treatment, the median corresponds to keeping all 12 units. We can only obtain a test result if we assign observations that equal the median to the group of observations greater than the median instead of to the group lower than the median as we do in all other Median tests reported.

while men care more about efficiency. Replicating Engelmann and Strobel's (2004) experiment that is similar to our impartiality treatment Fehr et al. (2006) find that women choose the most egalitarian allocation significantly more often than men. Dickinson and Tiefenthaler (2002) play an experiment with a disinterested third-party decision maker in which women are significantly more likely (by 13 percentage points) to choose an allocation resulting in equal payoffs, while men are 9 percentage points more likely to choose the most efficient allocation.

Gender differences in the risk treatment are smaller in absolute amounts, but clearly significant: they indicate that, on average, women are more risk-averse than men. Reviewing the vast economic literature on gender differences in risk preferences Eckel and Grossman (2006) conclude that women are characterized by a higher degree of risk aversion than men in field studies, while the results from laboratory experiments are less consistent. Similarly, Croson and Gneezy's (2004) survey summarizes that there is clear evidence that men are more risk-taking than women in most tasks and most populations.

Due to the small number of observations medians and distributions differ marginally in the dictator game treatment. We only have data on the behavior of 17 men and 19 women, but for those behavior clearly seems to differ: while male dictators, on average, transfer less than one unit, female dictators transfer nearly 2.5 units on average. Furthermore, about 70% of male dictators keep the whole pie, while only 37% of women do. Once again, our results confirm the previous findings: Eckel and Grossman (1998) find that women on average donate twice as much as men in a classical dictator game. Dufwenberg and Muren (2005) present the results of a dictator game in which significantly fewer men than women give non-zero amounts.[12] The most detailed analysis is by Andreoni and Vesterlund (2001). Playing dictator games with different levels of efficiency losses, they find that when it is relatively expensive to give, women are more generous than men. As the price of giving decreases, men begin to give more than women. For our parameter constellation, a 50% efficiency loss, they find that women are significantly more generous than men.

In sum, we are safe to conclude that men and women do not behave in the same way in our experiment. Consequently, we will focus on analyzing the data for men and women separately. We also present a joint analysis for the sake of completeness and to guarantee comparability of our results in the dictator game treatment to other dictator game studies.

4.2 Does the veil of ignorance make a difference?

Before turning to our hypotheses we will briefly compare our results in the dictator game treatment to those of other studies on dictator games that vary the price of giving. In our dictator game treatment, subjects on average give away 13% of the pie. With the same 50% efficiency loss and a similar pie size, they transfer 10% in Andreoni and Vesterlund (2001) and 21% in Andreoni and Miller (2002). In Fisman et al. (2005), for an efficiency loss of 30% or above, 60% of subjects transfer less than 5% of the pie, 17% transfer 5-15% of the pie, 10% 15-25% of the pie, while the remaining subjects transfer more. The corresponding figures in our experiment are astonishingly similar: 52.8%, 16.7% and 11.1%, respectively. Compared to the already existing data our results seem very reasonable.

We now return to hypothesis 1 and discuss whether social preferences and impartial social preferences do differ. If we were to find that they do we might want to question the use of people's stated social preferences from surveys and alike as a basis for "just" policy design. Our data would then suggest using impartially stated social preferences.

Result 1

There is a large and significant difference between social preferences and impartial social preferences with risk.

[12] In contrast Bolton and Katok (1995) find no systematic gender differences in a classical dictator game.

Table 5: test results for hypothesis 1

	mean dictator game treatment	mean impartiality treatment	Mann-Whitney test*	Median test*
all	10.39	8.52	p=0.000	p=0.000
men	11.24	9.19	p=0.003	p=0.018
women	9.63	7.00	p=0.002	p=0.000

*: The reported p-values refer to two-tailed tests and are adjusted for ties.

Hypothesis 1 can unambiguously be rejected according to the test results presented in Table 5: medians and distributions of the number of units not transferred differ significantly for the data pooled across sexes as well as if we analyze the behavior of men and women separately. Differences in means are also substantial: they amount to about two units in the whole sample. One would have expected hypothesis 1 to be true only if (i) experimental subjects were risk-neutral and (ii) they would behave impartially even if their role is known, i.e. if experimental subjects would not exhibit any egoism or subconscious self-serving bias in the dictator game treatment. Thus, the next step is to figure out where the significant differences between the dictator game treatment and the impartiality treatment stem from: Are they due to risk aversion only, the prevalence of impartial social preferences in the impartiality treatment as opposed to egoism in the dictator game treatment, or a combination of both? Analyzing the behavior in the risk treatment, we see that 68% of all subjects (actually, 80% of female and 61% of male subjects) transfer a positive amount despite the large efficiency loss occurred. The average number of units transferred is 3.1 for all subjects, 3.7 for women and 2.7 for men. The majority of our subjects clearly is risk-averse.[13]

4.3 Is the veil of ignorance only a concept about risk?

We use the testing strategy outlined in hypothesis 2 to find out whether risk aversion can account for all observed differences between the dictator game and the impartiality treatment or whether impartial social preferences are also at work.

[13] Actually the degree of risk-aversion implied by the data is enormous. This is well in line with many other experimental studies that document extreme values of relative risk aversion to small or moderate risks as for example Binswanger (1981) or Schlechter (2005).

Result 2

For female subjects impartial social preferences are a second significant motivation behind the veil of ignorance besides risk, while this is not true for men.

4.3.1 Data analysis at the aggregate level

Table 6 presents a comparison of the aggregate data obtained in the risk and the impartiality treatment.

Table 6: data analysis at the aggregate level

	mean risk treatment	mean impartiality treatment	Mann-Whitney test*	Median test*
all	8.93	8.52	p=0.203	p=0.484
men	9.28	9.19	p=0.773	p=0.980
women	8.31	7.00	p=0.011	p=0.047

*: The reported p-values refer to two-tailed tests and are adjusted for ties.

Analyzing only the data that are pooled for both sexes, we would conclude that hypothesis 2 cannot be rejected: both medians and distributions of the number of units not transferred do not differ significantly across the two treatments. Furthermore, the difference in means amounts to less than half of a unit. But we have already pointed out that considering the pooled data is highly misleading and inadequate as the distributions reflecting the behavior of men and women differ significantly. Taking a closer look at the data we find that there are strikingly different stories going on for men and women. While hypothesis 2 cannot be rejected for men at all, it actually can be rejected for women. For the female subjects, medians and distributions of units not transferred do differ significantly between the risk and the impartiality treatment. In sum, the data analysis at the aggregate level reveals that for female subjects impartial social preferences are a major motivation behind the veil of ignorance, while this is not true for men. On average, female subjects transfer about 1.3 units more in the impartiality treatment than in the risk treatment. This is a first indication that the effect of impartial social preferences points in the direction of an increased equality motive.

To check Rawls' prediction that maximin preferences prevail behind the veil of ignorance, in Table 7 we categorize the data according to "strong types", that is according to the share of subjects who decide in favor of full efficiency or full equality in each of the two treatments.

Table 7: strong types

percentage of participants choosing	risk treatment	impartiality treatment
efficiency	all: 32.3 men: 38.9 women: 20.3	all: 27.5 men: 35.2 women: 10.0
equality, full insurance	all: 0.04 men: 0.04 women: 0.05	all: 13.7 men: 8.8 women: 25.0

Result 3

In the impartiality treatment, only 8.8% of men and 25.0% of women act according to maximin preferences. Still for women the effect of impartial social preferences clearly is to induce an increased concern for equality.

We observe that nearly all subjects react to the large efficiency loss in the risk treatment: only very few subjects choose full insurance by equalizing payoffs across states. In the impartiality treatment, the share of subjects choosing full equality increases substantially, by about 8 percentage points for men and even 25 percentage points for women. For the pooled data, the share of people going for full efficiency is much more stable across treatments. This is essentially due to the fact that a bit more than one third of men goes for full efficiency in both the risk and the impartiality treatment. In sharp contrast, the share of women opting for full efficiency halves in the impartiality treatment. Compared to the situation in the one-person risk treatment, full efficiency implies maximal inequality in the impartiality treatment. All these findings underline major differences in the behavior of men and women: they show that in our experiment, women exhibit impartial social preferences in a much stronger way and are more concerned about equality than men.

4.3.2 Data analysis at the individual level

The results presented above are confirmed by the data analysis at the individual level where we can compare an individual's decision in the risk and the impartiality treatment. Table 8 classifies subjects according to three "weak types", namely whether an individual does not react at all to the existence of the second person in the impartiality treatment, whether it opts for more equality or for more efficiency as soon as the second person shows up. In total, we have observations on 131 subjects who participated in both the risk and the impartiality treatment, 91 of them male and 40 female.

Table 8: data analysis at the individual level (figures in per cent)

subjects who transfer ...	all	men	women
the same amount in the risk and the impartiality treatment	44	53	22.5
more in the impartiality treatment	35	24	60
less in the impartiality treatment	21	23	17.5

For more than half of the male subjects, the existence of the second person does not add impartial social preferences as a motive, while this is only true for less than 1/4 of female subjects.[14] For those male subjects for whom impartial social preferences play a role their effect is equally likely to point in the direction of an increased efficiency or an equality motive.[15] 60% of women transfer more in the impartiality treatment than in the risk treatment (3.1 units on average), but only

[14] Subjects who do not change their decision in the impartiality treatment as compared to the risk treatment could simply be convinced that their allocation chosen in the risk treatment is also the best for the second person in the impartiality treatment. While we cannot totally disapprove this possibility, we can be sure that these subjects' decisions are, on average, not driven by strong equality concerns: on average, they do transfer only 2.2 out of 12 units in the impartiality treatment.

[15] With theories on inequity aversion or the Rawlsian prediction of maximin preferences in mind, it might be astonishing that 23% of men and 17.5% of women choose to transfer fewer units in the impartiality than in the risk treatment in which considerations about inequality are not relevant. Our data reveal that those subjects who transfer less are substantially more risk averse than those who transfer more. A possible explanation for why subjects transfer less in the impartiality treatment could be that subjects maximize the sum of their own expected utility plus that of the second person, but do not have any distributional concerns. Consequently, subjects give away less (more) in the impartiality treatment if they perceive themselves as more (less) risk averse than the average participant. In the final questionnaire we asked our subjects to assess whether in the risk treatment they had transferred more or less than the average participant. We run an ordered logit regression to explain the difference in the number of units not transferred between the impartiality and the risk treatment. Controlling for actual risk aversion and subject characteristics,

about 1/4 of men do (4.0 units on average). These findings confirm that for the vast majority of female subjects the veil of ignorance induces impartial social preferences besides inducing risk. For them, the effect of impartial social preferences clearly is to add an equality motive. Our results for women imply that maximin preferences can also be derived from a combination of some, not necessarily infinite risk aversion and social preferences. This result contrasts the Utilitarians' claim that maximin preferences necessarily represent preferences with infinite risk aversion.

5 Conclusion

Rawls' declaration that a truly just allocation of resources can only be based on impartial judgments is as attractive as disputable: democratic institutions rest upon the assumption that competition of vested interests is able to balance them appropriately. It is not the aim of this paper to comment on this. The experimental data presented here simply show that social preferences stated without and behind the veil of ignorance do clearly differ. Behind the veil of ignorance, only a minority of subjects behaves according to maximin preferences. Still we have presented extensive evidence that behind the veil of ignorance women (in contrast to men) display an increased concern for equality. Their choice of more equal allocations is due to a combination of risk aversion and impartial social preferences that value equality per se. Thus, our results challenge the Utilitarians' claim that maximin preferences necessarily represent preferences with infinite risk aversion.

On a technical level, we have presented an experimental design that achieves to separate the effects of risk and impartial social preferences behind the veil of ignorance. Furthermore, our experiment successfully addresses the question whether impartial social preferences induce a stronger concern for equality or efficiency than social preferences. Still, we cannot isolate impartial social preferences in a stronger sense that would allow for an even more detailed comparison of social and impartial social preferences. This is an open challenge for future research.

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the individual perception of the own risk aversion as compared to average risk aversion is not significant. Consequently, our data do reflect distributional concerns.

6 Appendix

6.1 Experimental sessions, instructions and control questions

The order of events during each experimental session was the following: Subjects were welcomed and randomly assigned a cubicle in the laboratory where they took their decisions in complete anonymity from the other participants. The random allocation to a cubicle also determined the individual treatment order. Subjects were handed out the instructions for their first treatment and answered several computerized control questions that tested their understanding of the decision situation. Only after providing and explaining the right answers on the computer screen, we proceeded to the decision stage of the first treatment. After a false restart the second treatment followed with the same procedures. We finished each experimental session by letting subjects answer a questionnaire that asked for demographic characteristics, the strategies they had used and their expectations concerning the behavior and attitudes of the other subjects.

Both instructions and control questions were originally in German. The translated instructions and control questions presented below are those that belong to the impartiality treatment. The instructions and control questions for the dictator game and the risk treatment are structured and phrased in the same way with just one exception: to explain the risk treatment in the most natural and easiest possible way the instructions did not mention the state of being participant A (dictator) or B (receiver), but described the two possible states by throwing a dice and getting either an even or an odd number. The instructions of the dictator game and the risk treatment are available from the author.

6.1.1 Instructions

General explanations concerning the experiment

Welcome to this economic experiment.

If you read the following instructions carefully you will be able to earn an amount of money that depends on your own decisions. Therefore it is very important that you read these explanations carefully. If you have any questions please do not hesitate to ask us. Please raise your hand and we will come to your seat.

During the experiment you are not allowed to talk to the other participants, to use cell phones or to start any programs on the computer. The neglect of these rules will lead to the exclusion from the experiment and all payments.

During the experiment we talk about points instead of Euros. Your total income will therefore be calculated in points first. At the end of the experiment, the total amount of points obtained during the experiment will be converted in Euros at an exchange rate of

1 point = 1 Euro.

At the end of the experiment, you will be paid your earned income that is the result of your decision in cash.

On the next pages we will explain the exact course of the experiment.

The Experiment

In this experiment there are **two participants**, A and B.

Participant A has an initial equipment of 12 points, whereas participant B has an initial equipment of 0 points. Participant A can transfer every integer amount between 0 and 12 points (0 and 12 included) to participant B. Every transfer leads to the loss of half of the transferred points. **This means that participant B receives only half of a point for every full point participant A transfers to him.** Participant B does not have any influence on the decision of participant A and the course of the game apart from being paid half of the points transferred to him by participant A at the end of the experiment. Participant A will be paid the amount of points that he does not transfer.

The following table shows all possible distributions of points for participant A and B at the end of the experiment:

A transfers to B	0	1	2	3	4	5	6	7	8	9	10	11	12
A's points	12	11	10	9	8	7	6	5	4	3	2	1	0
B's points	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6

The course of the experiment is the following:

Stage 1:

First, you have to decide how many points participant A transfers to participant B. This can be done by entering the number of points that are transferred from participant A to participant B on the following screen and pushing the "OK"-Button afterwards. **Note that at this stage you do not know yet whether you will be a participant A or a participant B in stage 2.** The computer has already randomly chosen another participant with whom you form a pair.

[screen]

Stage 2:

A random decision determines whether you are assigned the role of participant A or the one of participant B. When you are assigned the role of participant A the participant assigned to you has the role of participant B. When you are assigned the role of participant B the participant assigned to you has the role of participant A. **Every pair therefore consists of one real participant A and one real participant B.** Both during the experiment and afterwards neither you nor the participant assigned to you know who the respective partner is.

Stage 3:

Your decision in stage 1 will be realized in any case, independent from whether you are assigned to the role of participant A or B. (This is possible because only half of the participants present in this room are taking part in the same experiment as you do. The other half of the participants is playing another experiment whose payoff does not affect you at all. You are assigned a participant from this other half.)

Example 1: You decide that A transfers 5 points to B. B therefore obtains 5:2=2.5 points and A keeps 12-5=7 points. Afterwards, it is decided by drawing lots that you are participant B. Your decision is implemented: You obtain 2.5 points. The participant assigned to you obtains 7 points.

Example 2: You decide that A transfers 5 points to B. B therefore obtains 5:2=2.5 points and A keeps 12-5=7 points. Afterwards, it is decided by drawing lots that you are participant A. Your decision is implemented: You obtain 7 points. The participant assigned to you obtains 2.5 points.

This experiment is played only once. At the end of the experiment all participants A and B are paid their income **in cash**.

If you have any questions please raise your hand. We will come to your seat to answer your question.

6.1.2 Control questions

Question 1: You decide that A transfers 3 points to B. It is decided by drawing lots that you are participant A.

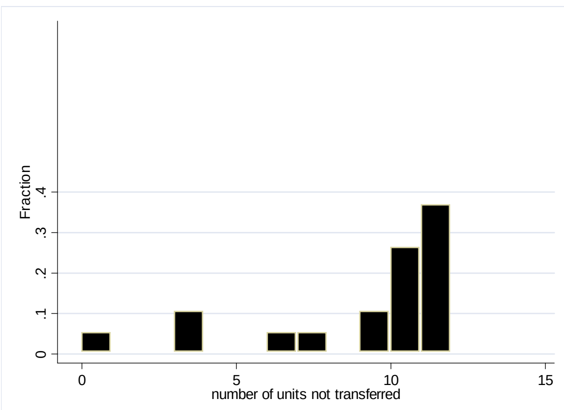
How many points does B get?
How many Euros will you be paid?
How many Euros will your randomly assigned participant B be paid?

Question 2: You decide that A transfers 6 points to B. It is decided by drawing lots that you are participant B.

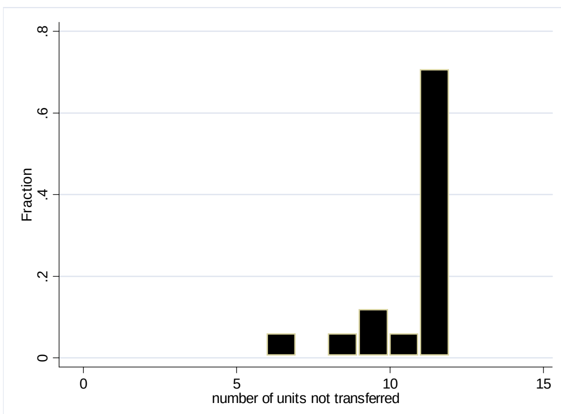
How many points does B get?
How many Euros will you be paid?
How many Euros will your randomly assigned participant A be paid?

6.2 Histograms by treatment and sex

6.2.1 dictator game treatment

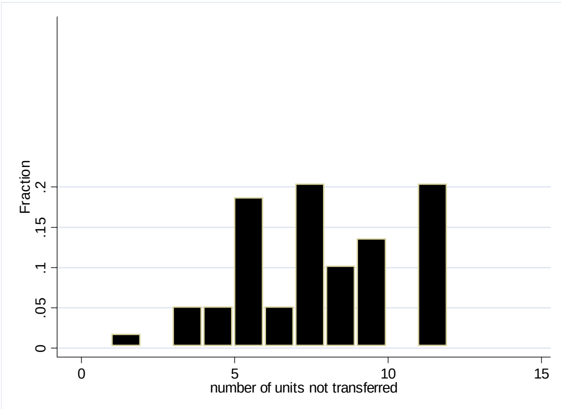


women (19 observations)

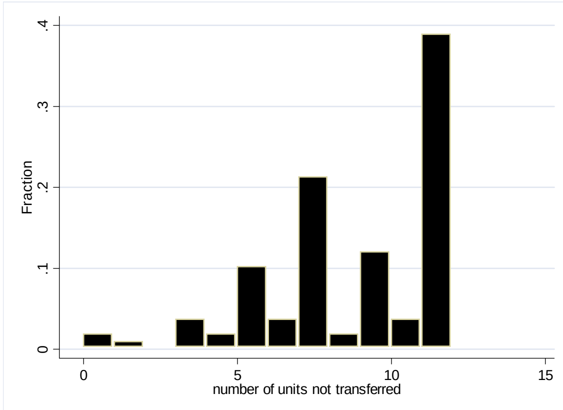


men (17 observations)

6.2.2 risk treatment

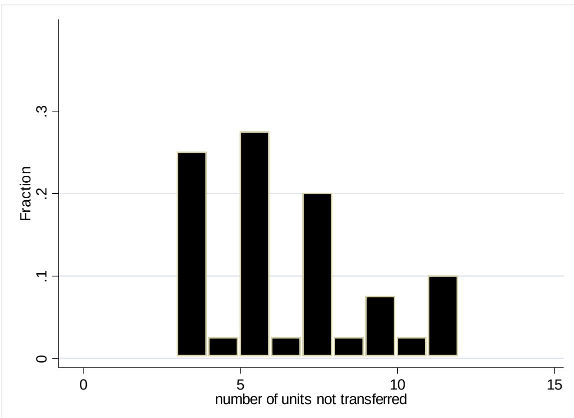


women (59 observations)

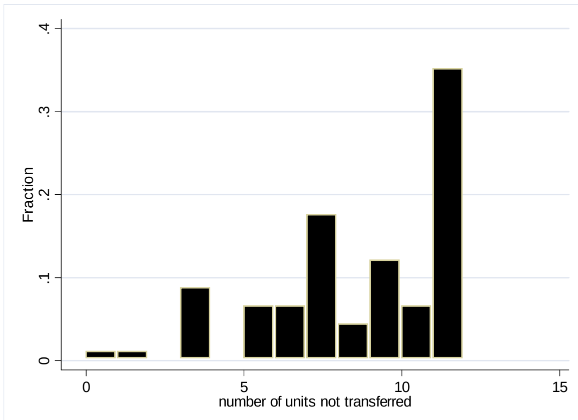


men (108 observations)

6.2.3 impartiality treatment



women (40 observations)



men (91 observations)

6.3 Pooling and order effects

In total we conducted nine sessions. In five sessions, all subjects played the risk and the impartiality treatment, though in different orders. In the remaining four sessions, half of the participants first played the risk and then the impartiality treatment, while the other half of participants first played the dictator game and then the risk treatment. The three treatment orders played by our subjects are depicted in table 9.

Table 9: treatment orders

first treatment	second treatment	number of subjects
risk	impartiality	83
impartiality	risk	48
dictator game	risk	36

Before we can pool the data obtained in one specific treatment, but from different treatment orders we have to make sure that there are no systematic differences between different treatment orders that could, for example, be due to anchoring.

The impartiality treatment is played in two treatment orders, namely risk - impartiality and impartiality - risk. We use Mann–Whitney tests to check whether the distributions of the number of units not transferred obtained in the two treatment orders are statistically significantly different. In the risk treatment, we have three treatment orders: risk - impartiality, impartiality - risk and dictator game - risk. The Kruskal-Wallis test checks whether the distributions of the risk treatment data obtained in the three different treatment orders are statistically significantly different. Table 10 gives an overview on the test results concerning potential order effects in the impartiality and the risk treatment:

Table 10: test results concerning the existence of order effects in the impartiality (Mann-Whitney test) and the risk treatment (Kruskal-Wallis test)

	Mann-Whitney test*	Kruskal-Wallis test*
all	p=0.627	0.464
men	p=0.810	0.729
women	p=0.505	0.816

*: The reported p-values refer to two-tailed tests and are adjusted for ties.

We find that we can pool all decisions in the impartiality treatment as well as those in the risk treatment irrespective of the order in which they were made for men, for women and for both sexes jointly.

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